Itokawa's Opposition Surge seen by Hayabusa/AMICA

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Using images acquired by the Hayabusa/AMICA instrument, along with Lederer et al.'s (2008) ground-based observations, we re-examine Itokawa's disk-integrated phase curve. The AMICA images provide critical opposition measurements (between 0.7° – 9.3° phase at 540 nm). Using Hapke's model (2012), we fit the updated phase curves at 5 different wavelengths. Preliminary modeling results show a range of porosity values commensurate with those in the literature (Ostro et al. 2004, Gundlach and Blum, 2012, Kiuchi and Nakamura 2014) based on an impact-generated grain size distribution function and grain size range evaluations from the AMICA data (Yano et al. 2006). This wide range on a global porosity is indicative of a highly variable porosity across the surface. The derived transport mean free path and the generally forward scattering nature of the global regolith are indicative of scattering centers (such as cracks, bubbles, and inclusions) that are small compared to the observational wavelengths. The derived regolith properties are compared with the imaging and sample analysis results, providing a test of the predictive capabilities of global disk-integrated measurements. This work suggests that the sub-pixel grain information could be extracted from the photometry, especially around opposition. This test is in preparation for activities in support of Hayabusa2's encounter with Ryugu in 2018. This work was supported by the JAXA/ISAS Hayabusa2 program, NASA Hayabusa2 participating scientist program (grant NNX16AL34G), and SSERVI – TREX.

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